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(19) (CA) **CANADIAN PATENT** (12)

(54) Coupon Inserting Apparatus and Method

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THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. Apparatus for positioning coupons, one at a time, at a predetermined location at a predetermined time, each of said coupons having a leading edge and a trailing edge, said coupons being provided as a stream of coupons arranged in a continuous web of successive coupons with a forwardmost coupon having its trailing edge connected to the leading edge of the next coupon in said continuous web by a weakened web portion extending transversely of said web, and each successive coupon being similarly connected in said web, said apparatus comprising:

support means;

positioning roll means rotatably mounted relative to said support means and defining a bight to receive the leading edge of said forwardmost coupon;

feed roll means rotatably mounted relative to said support means and spaced from said positioning roll means by a distance in excess of one coupon length, said feed roll means being oriented to direct said leading edge of said forwardmost coupon into said bight;

sensor means to sense the presence of and the absence of a coupon at a sensing position between said feed roll means and said positioning roll means;

positioning drive means to rotate said positioning roll means to move said forwardmost coupon at a predetermined speed;

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feed drive means to intermittently drive said feed roll means to move said leading edge of said forwardmost coupon toward said bight at a speed less than said predetermined speed whereby said positioning means, upon receipt of said leading edge in said bight separates the trailing edge of said forwardmost coupon from the leading edge of the next coupon, providing a gap therebetween at said sensing position; and

control means including timing means providing a signal related to the time which the forwardmost coupon is to be positioned at said predetermined location and means to actuate said feed drive means in response to said timing means and to the presence of said forwardmost coupon at said sensing position and to deactuate said feed drive means upon the sequential sensing of the absence and then the presence of a coupon at said sensing position.

2. Apparatus for positioning coupons, one at a time, at a predetermined location at a predetermined time, each of said coupons having a leading edge and a trailing edge, said coupons being provided as a stream of coupons arranged in a continuous web of successive coupons with a forwardmost coupon having its trailing edge connected to the leading edge of the next coupon in said continuous web by a weakened web portion extending transversely of said web, and each successive coupon being similarly connected in said web, said apparatus comprising:
support means;

positioning roll means rotatably mounted relative to said support means and defining a bight to receive the leading edge of said forwardmost coupon;

feed roll means rotatably mounted relative to said support means and spaced from said positioning roll means by a distance in excess of one coupon length, said feed roll means being oriented to direct said leading edge of said forwardmost coupon into said bight;

sensor means to sense the presence of and the absence of a coupon at a sensing position between said feed roll means and said positioning roll means;

coupon web supply means positioned relative to said support means to supply said continuous web to said feed roll means;

positioning drive means to rotate said positioning roll means to move said forwardmost coupon at a predetermined speed;

feed drive means to intermittently drive said feed roll means to move said leading edge of said forwardmost coupon toward said bight at a speed less than said predetermined speed whereby said positioning means, upon receipt of said leading edge in said bight separates the trailing edge of said forwardmost coupon from the leading edge of the next coupon, providing a gap therebetween at said sensing position; and

control means including timing means providing a signal related to the time at which the forwardmost coupon is to be positioned at said predetermined location and means to

actuate said feed drive means in response to said timing means and to the presence of said forwardmost coupon at said sensing position and to deactuate said feed drive means upon the sequential sensing of the absence and then the presence of a coupon at said sensing position.

3. The apparatus of claim 1, wherein said weakened web portions are perforated lines.

4. The apparatus of claim 2, wherein said coupon web supply means is a flexible conduit mounted to said support means upstream of said feeding roll means.

5. The apparatus of claim 4, further comprising locating means mounted to said support means for angularly positioning said flexible conduit about pivot, said locating means cooperating with said coupon web supply means for orienting said support means relative to said predetermined location.

6. The apparatus of claim 1, wherein said positioning roll means comprises a first pair of rollers mounted to said support means for rotation about axes transverse to said continuous web of coupons.

7. The apparatus of claim 6, wherein said feed roll means comprises a second pair of rollers mounted to said support means for rotation about axes transverse to said continuous web of coupons, said second pair of rollers located upstream of said first pair of rollers.

8. The apparatus of claim 1, wherein said sensor means comprises a first photoelectric sensor for generating a signal indicative of the presence of said coupon at said sensing position and circuit means responsive to the absence of such a coupon.

9. The apparatus of claim 1, wherein said timing means includes detector means for detecting a container moving relative to said predetermined location and for providing said signal indicative of said container position to actuate said feed drive means for separating the forwardmost coupon from the leading edge of the next coupon and inserting said forwardmost coupon into said container.

10. The apparatus of claim 9 wherein said timing means and detector means provide a timing signal relating to the position and rate of change of position of said container.

11. The apparatus of claim 9, wherein said control means includes means for determining said time, said time also being the time when said container reaches said predetermined location.

12. The apparatus of claim 9, wherein said container detector means comprises a second photoelectric sensor means.

13. The apparatus of claim 1, wherein said timing means comprises first and second photoelectric sensors disposed at a

fixed distance from each other and relative to said predetermined location, said first and second photoelectric sensors providing signals indicative of the detection of a forwardmost container in a plurality of moving containers moving at varying speeds relative to said predetermined location.

14. The apparatus of claim 13, wherein said controlling means includes means for calculating, responsive to said signals from said first and second photoelectric sensors, said time when said forwardmost container reaches said predetermined location.

15. Coupon inserting apparatus for positioning coupons, one at a time, at a predetermined location at a predetermined time, each of said coupons being provided as a stream of coupons arranged in a continuous web of successive coupons with a forwardmost coupon having its trailing edge connected to the leading edge of the next coupon in said continuous web by a perforated line, and each successive coupon being similarly connected in said web, said apparatus comprising:

a housing;

a first pair of rollers mounted to said housing and rotatable about axes transverse to said continuous web of coupons and defining a bight to receive the leading edge of the forwardmost coupon;

a second pair of rollers mounted to said housing,

rotatable about axes transverse to said stream of coupons and spaced upstream from said first pair of rollers in excess of one coupon length, said second pair of rollers being oriented to direct said leading edge of said forwardmost coupon into said bight;

first roller drive means to continuously actuate said first pair of rollers to move said forwardmost coupon at a predetermined speed;

second roller drive means to intermittently drive said second pair of rollers to move said leading edge of said forwardmost coupon toward said bight along a coupon path at a speed substantially less than said predetermined speed;

a first light reflective sensor to sense the presence of and the absence of a coupon at a sensing position along said coupon path between said first pair of rollers and said second pair of rollers;

a flexible conduit mounted upstream of said second pair of rollers to supply said continuous web to said second pair of rollers;

a second light reflective sensor for detecting a container moving relative to said predetermined location and for providing a timing signal indicative of said container position; and

control means to actuate said second roller drive means in response to said timing signal and the presence of

said forwardmost coupon at said sensing position and to de-actuate said second roller drive means upon the sequential sensing of the absence and then the presence of the next succeeding coupon at said sensing position, whereby said first pair of rollers, upon receipt of said leading edge in said bight, separates the trailing edge of said forwardmost coupon from the leading edge of the next succeeding coupon while said perforated line is between said second pair of rollers and said sensing position, providing the absence of a coupon at said sensing position, said first pair of rollers, upon separating the forwardmost coupon, inserts the forwardmost coupon into said container at said predetermined location.

16. Apparatus for positioning coupons, one at a time, at a predetermined location at a predetermined time, each of said coupons having a leading edge and a trailing edge, said coupons provided as a stream of coupons arranged in a continuous web, with a forwardmost coupon having its trailing edge connected to the leading edge of a successive coupon by a weakened web portion extending transversely of said web, said apparatus comprising:

support means;

positioning roll means rotatably mounted relative to said support means and defining a bight to receive the leading edge of said forwardmost coupon;

feed roll means rotatably mounted relative to said support means and disposed upstream from said positioning roll

means, said feed roll means being oriented to direct said leading edge of said forwardmost coupon into said bight;

sensor means to sense the presence of and the absence of a coupon at a sensing position along a coupon path between said feed roll means and said positioning roll means;

timing means providing a signal related to the time at which the forwardmost coupon is to be positioned at said predetermined location;

positioning drive means to drive said positioning roll means to move said forwardmost coupon at a predetermined speed;

feed drive means to drive said feed roll means to move said leading edge of said forwardmost coupon toward said bight at a speed substantially less than said predetermined speed whereby said positioning drive means, upon receipt of said leading edge in said bight, separates the trailing edge of said forwardmost coupon from the leading edge of the next coupon, at a position along said path between said feed roll and said sensing position; and

control means to actuate said feed drive means in response to said timing means and the presence of said forwardmost coupon at said sensing position and to deactuate said feed drive means upon the sequential sensing of the absence and then the presence of a coupon at said sensing position.

17. The apparatus of claim 16 wherein said positioning drive means is intermittently actuated by said control means

2013280

-38-

synchronously with said feed drive means.

18. A method for positioning coupons, one at a time, at a predetermined location at a predetermined time, each of said coupons having a leading edge and a trailing edge, said coupons being provided as a stream of coupons in a continuous web with a forwardmost coupon having its trailing edge connected to the leading edge of the next coupon in said continuous web by a weakened web portion extending transversely of said web, and each successive coupon being similarly connected in said web, said method comprising the steps of:

providing a timing signal related to said predetermined time at which said forwardmost coupon is to be positioned at said predetermined location;

sensing the presence of and the absence of a coupon at a sensing position along a coupon path relative to said predetermined location;

advancing said continuous web along said coupon path toward said predetermined location in response to said timing signal and sensing the presence of said forwardmost coupon at said sensing position;

bursting said forwardmost coupon from the next coupon in said continuous web along said weakened web portion while at least a portion of said forwardmost coupon is at said coupon sensing position;

moving said forwardmost coupon toward said predetermined location at a predetermined speed, whereby said

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forwardmost coupon is positioned relative to said predetermined location at said predetermined time; and

arresting travel of said continuous web upon the sequential sensing of the absence of said forwardmost coupon and then the presence of the next succeeding coupon at said sensing position.

19. Apparatus for positioning coupons into moving containers at a point of insertion, said coupons provided in a continuous web wherein the trailing edge of a first coupon is connected to the leading edge of a successive coupon with a separable portion, said apparatus comprising:

coupon advancing means including feed roll means and feed drive means to rotate said feed roll means, said feed roll means engaging said continuous web to advance said first coupon of said continuous web to a delivery position;

coupon sensing means for sensing said first coupon relative to said delivery position and for providing a sensing signal indicative of a change of position of said first coupon relative to said delivery position;

delivery means including positioning roll means for engaging said first coupon in said delivery position and positioning drive means to rotate said positioning roll means at a predetermined speed to separate the trailing edge of said first coupon from the leading edge of the successive coupon along said separable portion while the successive coupon is engaged by said feed roll means and to deliver said coupon into

at least one of said moving containers at said point of insertion; and

control means including timing means providing a timing signal related to the time at least one of said moving containers passes said point of insertion and means to actuate said feed drive means in response to said timing signal and to deactuate said feed drive means in response to said coupon sensing signal.

20. Coupon inserting apparatus comprising:

coupon supply means for providing coupons in a continuous web wherein the trailing edge of a first coupon is connected to the leading edge of a successive coupon with a separable portion;

container advancing means for moving at least one container to a point of insertion;

timing means for providing a timing signal indicative of the time when said at least one container passes said point of insertion;

coupon advancing means for engaging said continuous web of coupons and advancing said first coupon of said continuous web to a delivery position;

coupon sensing means for sensing said first coupon at a sensing position relative to said delivery position and for providing a sensing signal indicative of a change of position of said first coupon relative to said delivery position;

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delivery means for engaging said first coupon in said delivery position to separate said first coupon from the successive coupon along said separable portion while the successive coupon is engaged by said advancing means; and

control means responsive to said timing signal and said coupon sensing signal to actuate said coupon advancing means to move said coupon to said delivery position relative to said at least one moving container, whereby said delivery means separates said forwardmost coupon from said continuous web and delivers said forwardmost coupon into said at least one container at said point of insertion, and to deactuate said coupon advancing means when said forwardmost coupon has existed from said delivery position.

21. Apparatus for positioning coupons into moving containers at a point of insertion, said coupons provided in a continuous web wherein the trailing edge of a first coupon is connected to the leading edge of a successive coupon with a separable portion, said apparatus comprising:

coupon advancing means including feed roll means and feed drive means to rotate said feed roll means, said feed roll means engaging said continuous web to advance said first coupon of said continuous web to a delivery position;

coupon sensing means for sensing said first coupon relative to said delivery position and for providing a sensing signal indicative of a change of position of said first coupon relative to said delivery position;

2013280

-42-

delivery means including positioning roll means for engaging said first coupon in said delivery position and positioning drive means to rotate said positioning roll means to separate the trailing edge of said first coupon from the leading edge of the successive coupon along said separable portion while the successive coupon is engaged by said feed roll means and to deliver said coupon into at least one of said moving containers at said point of insertion; and

control means including timing means providing a timing signal related to the time at least one of said moving containers passes said point of insertion, means to actuate said feed drive means in response to said timing signal and to deactuate said feed drive means in response to said coupon sensing signal, and means to actuate said delivery means to engage said forwardmost coupon in response to said timing signal and to deactuate said delivery means in response to said coupon sensing signal.

SMART & BIGGAR
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PATENT AGENTS



AT

COUPON INSERTING APPARATUS AND METHODBackground Of The Invention

5 The present invention relates to apparatus and
methods for inserting coupons into containers moving along
a high volume handling system. In particular, the
invention separates the forwardmost coupon from a
continuous web and injects the coupon into a container as
the container passes a designated location for insertion.
10 It is a common advertising and promotional
technique to place coupons or other leaflets into
containers, such as cartons for breakfast cereal or snack
items, along with the product to be sold. The consumer
may use the coupon for whatever purpose intended, such as
15 for discount or future purchases or a rebate. Many
devices have therefor been provided to deposit coupons
into containers in the present day packaging industry.

This is just one use for the invention which
will be described in detail hereinafter. However, it
20 should be understood that the word "coupon" is used in its
broadest possible sense to include any coupon, card,
sheet, receipt, warranty, premium or other part that can
advantageously be handled as described hereinafter.



Similarly, "container" is used in the broadest possible sense to include containers such as boxes, tubs, cans and vessels of all kinds as well as any other coupon-receiver which can advantageously be used with this invention.

5 Typically, coupon inserting devices operate by discharging or positioning a single coupon in each of a plurality of containers which rapidly move along a conveyor system or similar material handling system. The containers are positioned in a particular relationship to
10 the mechanism involved. Known inserting devices, while they perform satisfactorily under certain circumstances, are somewhat unreliable, inflexible and expensive to manufacture, set-up, operate and maintain.

 Commonly, coupon dispensing systems require a
15 stack of precut coupons that are individually dispensed from a downwardly sloping channel. One arrangement of this type is disclosed in U.S. Patent 4,530,200. In that system, a pusher element and advancing rollers coact to withdraw the forwardmost coupon from a precut stack of
20 coupons. The coupon is thereby drawn into the downwardly sloping channel to the dispensing location. This arrangement, however, requires a separate cutting and stacking operation before the coupons are ready for the dispensing stage. Another arrangement providing a
25 downwardly sloping tray is disclosed in U.S. Patent 4,179,113. In that system, a reciprocal vacuum head dispenses each coupon from a stack of precut coupons arranged on an inclined tray and places the coupons in a conveyor system which transports the coupons to the
30 containers.

Still other systems require mechanical cutting devices such as a scissors device to separate each coupon from a continuous web. Such an arrangement is disclosed in U.S. Patent 4,354,894. In that system, an advance drum
5 draws the coupons away from the coupon web and toward a scissors device which separates the coupon web into individual coupons. The coupons are thereafter dispensed to moving packages with the use of a conveyor system.

While such prior art systems may function
10 satisfactorily under certain conditions, they are quite complex, often requiring additional coupon processing stages. Such systems, moreover, are susceptible to jamming when operating at high rates of speed. As a result, a coupon may not be placed in every container. On
15 the other hand, two or more coupons may be inadvertently inserted in one container. Moreover, many of the known coupon inserting systems are not capable of accommodating various spacing of the containers and varying conveyor speeds. Further, the known systems do not easily
20 accommodate changes in the location of insertion or the size or shape of the container.

OBJECTS OF THE INVENTION

Accordingly, a general object of the present invention is to provide an improved coupon inserting
25 apparatus that overcomes the deficiencies of the prior art.

Similarly, an object of the present invention is to provide a coupon inserting apparatus that ascertains the location of each of a plurality of containers moving at varying speeds and positively places a coupon at that
5 location at a predetermined time.

An additional object of the present invention is to provide a coupon inserting apparatus capable of detaching a single coupon from a continuous web at high speed and with precision and inserting it into a
10 container.

It is another object of this invention to provide a new and unique method of storing a supply of coupons and efficiently and positively feeding them, one at a time, to a predetermined position at a predetermined
15 time.

Finally, an object of the present invention is to provide a coupon inserting apparatus that may be portably and universally located to operate at varying points of insertion and along varying insertion paths to
20 practice the unique method of this invention.

Other objects and advantages of the invention will become apparent upon reading the following description and appended claims, and upon reference to the accompanying drawings.

25

SUMMARY OF THE INVENTION

The above objects are accomplished by providing a coupon inserting apparatus that operates on a continuous web of separable coupons. The apparatus separates the forwardmost coupon from a continuous web in a controlled
30 intermittent operation. Successive coupons are connected

to each other by spaced-apart weakened portions, such as by perforations, extending transversely of the web. The forwardmost coupon is separated and inserted by rotating downstream rolls which function as a burster to apply separating tension to the coupon. After separating the forwardmost coupon, the coupon inserting apparatus directs the coupon into a container which may be rapidly moving.

The coupon inserting apparatus comprises support means, positioning roll means to separate the forwardmost coupon from the continuous web and dispense the coupon at a predetermined location, and feed roll means to intermittently advance the continuous web toward the positioning roll means. The positioning roll means includes a pair of spaced rolls rotatably mounted relative to the support means and defining a bight to receive the leading edge of the forwardmost coupon. In addition, positioning drive means continuously actuates the positioning roll means to move the forwardmost coupon at a predetermined speed.

The feed roll means includes a pair of spaced rolls located upstream from the positioning roll means by a distance in excess of one coupon length. The feed roll means are oriented to direct the leading edge of the forwardmost coupon into the bight formed by the positioning roll means. Feed drive means intermittently drives the feed roll means and advances the leading edge of the forwardmost coupon toward the bight formed by the positioning roll means. The feed drive means operates at a speed substantially less than the predetermined speed of the positioning roll means so that, upon receipt of the

leading edge of the forwardmost coupon, the forwardmost coupon is separated from the next coupon along the weakened web portion separating the coupons.

A specific feature of the present invention
5 utilizes control means to actuate and deactuate the feed drive means. The control means includes timing means and detects the position of a moving target or container. The timing means of the control means determines a predetermined time for the container to reach the point of
10 insertion. The control means also receives information from coupon sensing means located at a coupon sensing position between the positioning roll means and the feed roll means. The coupon sensing means detects the presence of and the absence of a coupon at the coupon sensing
15 position. The control means actuates the feed drive means at the predetermined time and upon sensing of the forwardmost coupon at the sensing location to draw the forwardmost coupon into the bight formed by the positioning means, thereby bursting the forwardmost coupon
20 from the continuous web. The positioning roll means moves the coupon toward the predetermined location of insertion at the predetermined speed. When the forwardmost coupon has exited the coupon sensing position, the coupon sensing means detects absence of the coupon. The control means
25 deactuates the feed drive means upon the sequential sensing of the absence of the forwardmost coupon and the sensing of the next coupon at the coupon sensing position. The inserting apparatus may thereby accomplish feeding of coupons to containers moving at varying rates of speed.

30 Another particular feature of the present invention is provided by a coupon web supply means that supplies the continuous web of coupons to the feeding roll

means. The coupon web supply means includes a flexible feeding chute having an output end that is fixed relative to the support means with an input end and a body that may be flexibly and tortuously positioned relative thereto. The support means of the coupon inserting apparatus is mounted by universal means for angularly positioning the coupon inserting apparatus about a joint. The supply means may include source means feeding the input end of the flexible chute. The source means may include means for storing a roll of preformed coupons in continuous web form, and associated dispensing rollers and the like. The source means may also comprise a storage means for a fan-folded web of coupons and associated dispensing mechanisms. Still another source means may include a source roll of unfolded coupons which make up the web, either pre-perforated or not. In that system, folding rolls and a perforating mechanism, if required, receive the web from the source roll and the folded and perforated web is fed through a take-up means to the input end of the flexible chute. Thus, the coupon inserting apparatus may be positioned to provide insertion of the coupons at varying points of insertion and from various sources.

BRIEF DESCRIPTION OF THE DRAWINGS

25 Fig. 1 is a perspective view of one embodiment of the coupon inserting apparatus of the present invention oriented relative to a conveying system, with part of the apparatus removed for clarity.

Fig. 2 is a simplified block diagram representation of the coupon inserting apparatus of Fig. 1.

Fig. 3 is a perspective view of the inserting head of the coupon inserting apparatus of Fig. 1.

Fig. 4 is an elevational view of the inserting head with a part of the apparatus removed.

Fig. 5 is a detailed perspective view of a mounting arrangement for the coupon inserting apparatus of Fig. 1 viewed from the bottom of the inserting head.

Fig. 6 is a sectional view of a coupon inserting apparatus illustrating the vertical adjustability thereof.

Fig. 7 is a plan view of a coupon inserting apparatus illustrating the horizontal adjustability thereof.

Fig. 8 is a flow diagram of the coupon and package processing steps in accord with the coupon inserting apparatus and method of the present invention.

Fig. 9 is a highly simplified perspective view of the coupon inserting apparatus of the present invention.

Fig. 10 is a diagrammatic representation of the coupon inserting apparatus of the present invention.

Fig. 11 is a diagrammatic representation of the coupon inserting apparatus including a fanfold supply means.

Fig. 12 is a diagrammatic representation of the invention using a fabricating supply means.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The following detailed description will permit a more complete understanding of this invention. However, the embodiments described below are simply examples of the invention and the invention is not limited to these 5 embodiments. Furthermore, the drawings are not necessarily to scale and certain elements may be illustrated by graphic symbols and fragmentary views. In certain instances, details may have been omitted which are 10 not necessary for an understanding of the present invention, including conventional details of fabrication and assembly.

Generally, the present invention relates to an apparatus and method for receiving a continuous web of 15 coupons, pulling the forwardmost coupon away from the continuous web, and dispensing the coupon at a predetermined time into a rapidly moving container as it passes a predetermined location. The device of this invention is intended to be integrated into a full service 20 container processing system, and will supply coupons into the containers at a location at which the containers have been formed, usually have not yet been filled and have not yet been closed.

Turning to the drawings, Fig. 1 shows a 25 perspective view of the coupon inserting system of the present invention including apparatus 5. Coupon inserting apparatus 5 includes an adjustable inserting head 8 which is positioned relative to a conveyor system 11 that transports a plurality of containers 10. The adjustable 30 inserting head 8 is secured to a universal mounting joint 92 at the distal end of a support arm 94. A mounting

shaft 94 is secured to a column 6 with use of a rotary joint 7 and securing means 13. The mounting post 6 is supported on a base 14 and also supports an electronic controller 70 which provides logical control for the coupon inserting head 8. It is desired that electronic controller 70 is enclosed in a cabinet suitable for the industrial environment.

Fig. 1 also shows a coupon reel 9 rotatably mounted on an axle which is secured to post 6. Coupon reel 9 provides a housing for a stream of coupons arranged in a continuous web 46 of a type which are to be processed for ultimate insertion into the containers 10. The first coupon in the series, forwardmost coupon 20, is succeeded by the next coupon 22. The coupons are spaced apart and connected by weakened portions extending substantially transversely of the web. Weakening can be accomplished by a line of perforations. A perforated line connects the trailing edge of forwardmost coupon 20 and the leading edge of coupon 22, extending transversely of the continuous web 46. The succeeding coupons are arranged in a similar manner. In the preferred embodiment, the coupons are about the size of a dollar bill, folded along transverse lines of the coupon which extend longitudinally in the web. This configuration permits easy insertion by coupon inserting head 8.

The adjustable inserting head 8 includes positioning roll means shown as a pair of spaced positioning rolls 48 and 50. Positioning rolls 48 and 50 are driven at a predetermined rotational speed by positioning drive means shown as stepper drive motor 58. A servo motor may also be used resulting in higher speed operation and concomitant higher cost. Adjustable

inserting head 8 also includes feed roll means shown as a pair of spaced feed rolls 36 and 38 which are located upstream from positioning rolls 48 and 50. Feed rolls 36 and 38 are intermittently driven at a lower rotational speed than the positioning rolls 48 and 50 by feed drive means shown as stepper drive motor 56. Feed rolls 36 and 38 draw the web of coupons 46 through a flexible feed chute 88 and toward the bight formed by positioning rolls 48 and 50.

At a predetermined time, feed rolls 36 and 38 cause the leading edge of the forwardmost coupon 20 to enter the bight 49 between positioning rolls 48 and 50. Positioning rolls 48 and 50 tear the forwardmost coupon 20 from the next succeeding coupon 22 along the perforated line of separation and inject forwardmost coupon 20 at a predetermined location. A photoelectric coupon sensor 62 is also shown disposed between feed rolls 36 and 38 and positioning rolls 48 and 50 to provide electronic controller 70 with sensed coupon location information.

Coupon inserting head 8 is placed relative to a conveyor system 11 that transports containers such as boxes or cartons to successive container processing stations. Conveyor system 11 includes a conveyor belt 12 which rests on support rollers, one such roller being shown as roller 14. A plurality of containers such as container 10 travel on conveyor belt 12 in the direction designated by arrow 15. For maximum production, conveyor belt 12 transports the containers at a high rate of speed.

A pair of photoelectric sensors 24 and 26 are placed relative to the conveyor system 11 and provide electronic controller 70 with timing information related to container position and motion. Electronic controller

70 processes the timing information and the coupon sensor information and actuates and deactuates the feed drive means in accordance therewith. The coupons are thereby inserted, one at a time, into the containers as the
5 containers pass coupon inserting head 8.

Referring now to Fig. 2, it is a block diagram of the operation of the coupon inserting apparatus of the present invention. The electronic controller 70 receives information from a coupon sensor 62 related to the
10 presence and absence of a coupon at a sensing point between the pair of feed rolls 36, 38 and the pair of positioning rolls 48, 50. The coupon position signal received by controller 70 is designated by a line 120. The electronic controller 70 also receives information
15 related to the position of the forwardmost container designated by a line 122. The controller 70 is preferably microprocessor controlled and may actually be a personal computer. It operates in a logical fashion to provide actuating and deactuating signals on a line 124 to a first
20 stepper motor controller 126. The stepper motor controller 126 provides a controlled pulse train represented by a line 128 to control the feed roll drive means; in this embodiment, stepper motor 56. Stepper motor 56 actuates and deactuates feeding rolls 36 and 38
25 in response to commands provided by controller 70.

Similarly, electronic controller 70 may provide actuating and deactuating signals represented by a line 130 to a second stepper motor controller 132. Stepper motor controller 132 likewise provides a controlled pulse
30 train on a line 134 for the operation of positioning roll drive means such as stepper motor 58. In a preferred mode of operation, electronic controller 70 provides a signal

for operating stepper motor 58 at a continuous rate of speed. Positioning rolls 48 and 50 are thereby rotating at a continuous predetermined speed.

As mentioned above, electronic controller 70 may
5 be a personal computer. Stepper motor controllers 126 and 132 comprise plug-in ramping pulse generators, such as Model No. VCO-1006, manufactured by Servo Systems Co. in Montville, New Jersey, used with CMD-40 or CMD-50 step motor drivers, also manufactured by Servo Systems Co. The
10 characteristics of the stepper motor controllers 126 and 132 provide for rapid acceleration and deceleration of stepper motors 56 and 58.

The support means for the coupon inserting apparatus is shown in Figs. 3 and 4. The support means
15 comprises a housing 72 that includes a base support plate 74, two lateral plates 76 and 84, an intermediate support plate 80, a chute support plate 130 and an end support plate 132 (Fig. 4). One of the lateral plates 76 is secured to the base support plate 74 using fastening
20 screws, one of which is designated as fastening screw 78, inserted through an aperture formed in the base support plate 74 and mated with threaded opening formed in the edge of side plate 76. Intermediate support plate 80 is secured to lateral support plate 76 with fastening screws,
25 one of which is designated as fastening screw 82. Fastening screw 82 is inserted in an aperture formed in side plate 76 and mates with a threaded opening formed in the edge of intermediate support plate 80. Similarly, lateral plate 84 is secured to intermediate support plate
30 80 by fastening screws, one of which is designated as fastening screw 86.

As best seen in Fig. 4, an end support plate 132 is fastened to the bottom support plate 74 and abuts lateral support plates 76 and 84. End support plate 132 is secured to base support plate 74 by fastening screws
5 such as screw 134 which passes through an aperture in end support plate 132 and mates with a threaded hole in the edge of bottom support plate 74. A chute support plate 130 abuts end plate 132 and is joined with end plate 32 with fastening screws 136 and 138. Chute support plate
10 130 provides a platform for the stream of coupons entering coupon inserting head 8.

The coupon web supply means is also shown in Figs. 3 and 4. The coupon web supply means includes a flexible feed chute 88 that guides the stream of coupons
15 from the continuous web of coupons 46 (Fig. 1). The flexible feed chute 88 is an enclosed carrier, preferably constructed of a flexible conduit such as Conduflex, manufactured by Kabelschlep. Flexible feed chute 88 is attached to housing 72 by mounting bracket 138. Mounting
20 bracket 138 includes a flange (not shown) that is fastened to end support plate 132 with fastening screws which mate with threaded holes in end support plate 132.

A feeding guide 110 is mounted on chute support plate 130 to provide alignment of the stream of coupons
25 entering coupon inserting head 8. Feeding guide 110 is adjustably mounted with the use of a pair of tensioning screws that are biased to provide light compression to feeding guide 110 against chute plate 30. For example, tensioning screw 142 and spring 144 provide downward force
30 to feeding guide 110. By adjusting the position of